

ON THE RELATIONS OF CERTAIN MYRMECOPHILES TO THEIR HOST ANTS.

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WASMANN, to whom we owe the bulk of our knowledge concerning myrmecophiles, divides the series of staphylinid beetles which live with the legionary ants into four biological groups.¹

These are,

1. **MIMICRY TYPE.** Including those which mimic, to a greater or less extent, the color, form, actions and other characteristics of their hosts.

2. **OFFENSIVE TYPE.** (Trutztypus.) Including those not fostered or willingly tolerated by the ants, but living a precarious existence in their nests and only escaping destruction through the ants' inability to capture them.

3. **SYMPHILY TYPE.** Including those which are tolerated on account of some benefit which the ants derive from them, usually forms with glandular hairs that secrete substances agreeable to the ants.

4. **INDIFFERENT TYPE.** Less specialized forms whose relations are not so easily interpreted.

It is about the first two types that I desire to confine my present remarks.

We have naturally, not far to seek to find an explanation for the resemblance between the ants and many of their guests. It is evidently advantageous for the myrmecophiles to resemble their hosts in size, form, color, odor and any other attributes which the ants are capable of perceiving. This is, I think, perfectly evident, for all ants show the greatest good will toward the members of their own nest and the more their guests approach their own kind in appearance the more readily they are tolerated.

This applies most strongly to myrmecophiles which depend to a greater or less extent upon concealment for safety. Even in the case of forms which supply pleasant secretions to the ants or are beneficial to them in other ways, it must enter at least to some extent into their relations. Thus protected they may at times either deceive the ants as to their identity and pass unnoticed, or at least attract less notice than if they were entirely different from the ants in appearance. This is evidently the chief value of mimicry to the guests living with ants which can readily discriminate such objects as color and form. Among ants with a keen

¹ Verh. d. deutschen Zool. Ges., 1902, p. 86.

sense of sight then, guests of the mimicry type have probably been developed through a natural selection exercised by the ants of the nest in which they live. This selection tends to produce a convergence of the guests toward the form of their hosts.

In the case of certain blind ants, however, for example members of the genus *Eciton*, the cause for a mimicry of color (and perhaps also form) cannot depend upon the ants themselves, for they cannot see. Recently Wasmann¹ has taken a very peculiar view of this question. In regard to my suggestion (Amer. Nat. XXXVI, 367 (1902)) that the resemblance in color and form of *Ecitonidia wheeleri* Wasm. to *Eciton schmitti* Em. is due to the influence of outside enemies, he thinks that this is untenable. His chief objection with regard to color seems to be that the species of *Eciton* which have no external eyes have no known guests which mimic them in color, while those with rudimentary eyes, e. g. *Eciton schmitti* Em., have. He is evidently unaware of the fact noted by Wheeler² that the external eyes of *Eciton schmitti* are mere vestiges which have no connection with the brain, and are hence of absolutely no use! This, then, places *E. schmitti* on the same basis as the other species of *Eciton*, and we cannot say that they exercise any selection over their guests as regards color. The fact still remains that some ecitophiles are similar to the host ant in color while others are not.³ However, with regard to the species of *Ecitonidia* which I have observed alive with its host ant (*Eciton schmitti* Em.), I am firmly convinced that its color resemblance is wholly for protection against insectivorous animals. No one can observe the files of this ant marching for long distances in the open glare of the Texas sun without being satisfied that color resemblance to its unpalatable host is very necessary to protect it from insectivorous enemies. On the other hand when one sees thousands of these same ants huddled together in a writhing mass in some small cavity under a stone, in company with specimens of *Ecitonidia*, it is hard to believe that the guests' presence is unknown to the ants, or that they could not get rid of them if they attempted to do so.

In spite of their blindness, it is probable therefore that Ecitons with such habits cannot as readily be deceived by a mimic as seeing ants which do not swarm in this manner.

¹ Zool. Anz. Bd. XXVI, No. 704, p. 581.

² Biological Bulletin, III., p. 188. (1902.)

³ Possibly after the habits of some of the tropical species of *Eciton* are more carefully studied, reasons for the color difference may become apparent.